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GASB STATEMENT NO. 67 REPORT

FOR THE

MISSOURI STATE EMPLOYEES'

RETIREMENT SYSTEM

PREPARED AS OF JUNE 30, 2017

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October 10, 2017

Board of Trustees
Missouri State Employee' Retirement System
907 Wildwood Drive
Jefferson City, Missouri 65109

Dear Board Members:

Presented in this report is information to assist the Missouri State Employees' Retirement System in meeting the requirements of the Governmental Accounting Standards Board (GASB) Statement No. 67. The information is presented for the June 30, 2017 Measurement Date. The calculations in this report have been made on a basis that is consistent with our understanding of this accounting standard (GASB 67). Please note that the discount rate used to determine the Total Pension Liability changed from 7.65% at the Prior Measurement Date to 7.50% at the current Measurement Date.

The annual actuarial valuation used as a basis for much of the information presented in this report was performed as of June 30, 2017. The valuation was based upon data, furnished by the System's staff, concerning active, inactive and retired members along with pertinent financial information. This information was reviewed for completeness and internal consistency, but was not audited by us. The valuation results depend on the integrity of the data. If any of the information is inaccurate or incomplete, our results may be different and our calculations may need to be revised. Please see the actuarial valuation for additional details on the funding requirements for the System including actuarial assumptions and methods and the funding policy.

To the best of our knowledge, the information contained in this report is complete and accurate. The calculations were performed by qualified actuaries according to generally accepted actuarial principles and practices, as well as in conformity with Actuarial Standards of Practice issued by the Actuarial Standards Board. The calculations are based on the current provisions of the System, and on actuarial assumptions that are internally consistent and individually reasonable based on the actual experience of the System. In addition, the calculations were completed in compliance with applicable law and, in our opinion, meet the requirements of GASB 67.

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These results are only for financial reporting and may not be appropriate for funding purposes or other types of analysis. Calculations for purposes other than satisfying the requirements of GASB 67 may produce significantly different results. Future actuarial results may differ significantly from the current results presented in this report due to such factors as changes in plan experience or changes in economic or demographic assumptions.

We, Patrice A. Beckham, FSA, Joseph A. Nichols, ASA and Bryan K. Hoge, FSA, are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein. We are available to answer any questions on the material contained in this report or to provide explanations or further details as may be appropriate.

Respectfully submitted,

Patrice Beckham

Patrice A. Beckham, FSA, EA, FCA, MAAA
Principal and Consulting Actuary

Joseph A. Nichols, ASA, EA, MAAA, MSPA
Consulting Actuary

Bryan K. Hoge, FSA, EA, FCA, MAAA
Senior Actuary

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REPORT OF THE ANNUAL GASB STATEMENT NO. 67

MISSOURI STATE EMPLOYEES' RETIREMENT SYSTEM

SUMMARY OF PRINCIPAL RESULTS

Valuation Date (VD):	June 30, 2017
Prior Measurement Date:	June 30, 2016
Measurement Date (MD):	June 30, 2017
Membership Data:	
Retirees and Beneficiaries	46,560
Inactive Vested Members	20,605
Inactive Nonvested Members	3,899
Active Employees	48,910
Total	119,974
Single Equivalent Interest Rate (SEIR):	
Long-Term Expected Rate of Return	7.50%
Municipal Bond Index Rate at Prior Measurement Date	2.85%
Municipal Bond Index Rate at Measurement Date	3.56%
Year in which Fiduciary Net Position is Projected to be Depleted	N/A
Single Equivalent Interest Rate at Prior Measurement Date	7.65%
Single Equivalent Interest Rate at Measurement Date	7.50%
Net Pension Liability:	
Total Pension Liability (TPL)	$13,152,273,895
Fiduciary Net Position (FNP)	7,945,358,298
Net Pension Liability (NPL = TPL – FNP)	$5,206,915,597
FNP as a percentage of TPL	60.41%

INTRODUCTION

The Governmental Accounting Standards Board issued Statement No. 67 (GASB 67), *Financial Reporting for Pension Plans*, in June 2012. The effective date for reporting under GASB 67 for the Missouri State Employees' Retirement System was the fiscal year ending June 30, 2014. Based on the provisions of GASB 67, the Missouri State Employees' Retirement System (MOSERS or System) is a cost-sharing multiple employer defined benefit pension plan.

This report, prepared as of June 30, 2017 (the Measurement Date), presents information to assist the System in meeting the requirements of GASB 67. Much of the material provided in this report is based on the data, assumptions and results of the annual funding actuarial valuation of the System performed as of June 30, 2017 (the Valuation Date). The results of that valuation were detailed in a report dated September 11, 2017.

GASB 67 discloses the Total Pension Liability (TPL) utilizing the Entry Age Normal actuarial cost method. The Net Pension Liability (NPL) is equal to the TPL minus the System's Fiduciary Net Position (FNP) (basically the fair (market) value of assets). The benefit provisions recognized in the calculation of the TPL are summarized in Appendix B.

Among the items needed for the liability calculation is the discount rate, or Single Equivalent Interest Rate (SEIR), as described by GASB 67. To determine the SEIR, the FNP must be projected, using GASB 67 guidelines, into the future for as long as there are anticipated benefits payable under the plan's provisions applicable to the members and beneficiaries of the System on the Measurement Date. If the FNP is not projected to be depleted at any point in the future, the long-term expected rate of return on plan investments expected to be used to finance the benefit payments may be used as the SEIR.

If, however, the FNP is projected to be depleted at a future measurement date, the SEIR is determined as the single rate that will generate a present value of benefit payments equal to the sum of the present value determined by discounting all projected benefit payments through the date of depletion by the long-term expected rate of return, and the present value determined by discounting those benefits after the date of depletion by a 20-year tax-exempt municipal bond (rating AA/Aa or higher) rate. The rate used, if necessary, for this purpose is the monthly average of the Bond Buyers General Obligation 20-year Municipal Bond Index Rate (formerly published monthly by the Board of Governors of the Federal Reserve System).

Our calculations indicate that the FNP is not projected to be depleted, so the Municipal Bond Index Rate is not used in the determination of the SEIR for either the June 30, 2016 or the June 30, 2017 TPL. The SEIR for the Measurement Date is 7.50%, the long-term assumed rate of return on

investments. The SEIR for the Prior Measurement Date was 7.65%. Please see Paragraph 31.b.(1) for more explanation of the development of the SEIR.

The FNP projections are based upon the System's financial status on the Measurement Date, the indicated set of methods and assumptions, and the requirements of GASB 67. As such, the FNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing plan basis, reflecting the impact of future members. Therefore, the results of this test do not necessarily indicate whether or not the System will actually run out of money, the financial condition of the System, or the System's ability to make benefit payments in future years.

The sections that follow provide the results of all the necessary calculations, presented in the order presented in GASB 67 for note disclosure and Required Supplementary Information (RSI).

SECTION I – NOTES TO FINANCIAL STATEMENTS

The material presented herein will follow the order presented in GASB 67. Paragraph numbers are provided for ease of reference.

Paragraphs 30.a. (1)-(3): This information will be supplied by the System.

Paragraph 30.a. (4): The data required regarding the membership of the System were furnished by the System. The following table summarizes the membership of the System as of June 30, 2017, the date of the valuation used to determine the June 30, 2017 TPL.

Membership

Number as of June 30, 2017	
Inactive Members Or Their Beneficiaries Currently Receiving Benefits	46,560
Inactive Members Entitled To But Not Yet Receiving Benefits	20,605
Inactive Nonvested Members	3,899
Active Members	48,910
Total	119,974

Paragraphs 30.a. (5)-(6) and Paragraphs 30.b.-f.: This information will be supplied by the System.

Paragraph 31.a. (1)-(4): As stated earlier, the NPL is equal to the TPL minus the FNP. That result, as of June 30, 2017, is presented in the following table.

Fiscal Year Ending June 30, 2017		
Total Pension Liability	$	13,152,273,895
Fiduciary Net Position		7,945,358,298
Net Pension Liability	$	5,206,915,597
Ratio of Fiduciary Net Position to Total Pension Liability		60.41%

Paragraph 31.b.: This paragraph requires information to be disclosed regarding the actuarial assumptions and other inputs used to measure the TPL. The complete set of actuarial assumptions and other inputs utilized in developing the TPL are outlined in Appendix C. The TPL as of June 30, 2017 was determined based on an actuarial valuation prepared as of June 30, 2017, using the following key actuarial assumptions and other inputs:

Price Inflation	2.50 percent
Payroll Growth	3.00 percent
Salary increases, including wage inflation	3.25 to 8.75 percent; General Assembly is assumed to only get Wage Inflation
Long-term Rate of Return, net of investment expense, including price inflation	7.50 percent
Municipal Bond Index Rate	
Prior Measurement Date	2.85 percent
Measurement Date	3.56 percent
Year FNP is projected to be depleted	N/A
Single Equivalent Interest Rate, net of investment expense, including price inflation	
Prior Measurement Date	7.65 percent
Measurement Date	7.50 percent

Cost-of-living adjustment	4.00%, compounded annually, when a minimum COLA of 4.00% is in effect. 2.00%, compounded annually, when no minimum COLA is in effect (80% of price inflation).
Mortality	Pre-retirement mortality rates were based on the RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015 (scaled by 95% for males and 90% for females). Post-retirement mortality rates were based on the RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120%.

Disabled mortality rates were based on the RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015 (scaled by 95% for males and 90% for females).

The actuarial assumptions used in the valuation are based on the results of the most recent actuarial experience study, which covered the five-year period ending June 30, 2015. The experience study report, performed by the prior actuary, is dated March 28, 2016.

Paragraph 31.b.(1)

(a) Discount rate (SEIR): The discount rate used to measure the TPL at June 30, 2017 was 7.50%. The discount rate used to measure the TPL at the Prior Measurement Date was 7.65%.

(b) Projected cash flows: The projection of cash flows used to determine the discount rate assumed that plan contributions from members and the employers will be made at the contribution rates as set in state statute:

   a. Employee contribution rate: 4.00% of salary for members hired on or after 1/1/2011; no contributions for members hired before 1/1/2011.
   b. Employer contribution rate: The actuarial required contribution rate including a minimum contribution rate that shall not fall below the rate set for fiscal year 2015 (16.97%), until the plan is at least 80% funded.
   c. Administrative expenses in the prior year were projected forward with price inflation as an estimate for administrative expenses in the current and future years. The portion of expenses in future years allocated to the current members was based on the proportionate share of covered payroll in each year for the remainder of the existing members to the total covered payroll for all members.

Based on those assumptions, the System's FNP was projected to be available to make all projected future benefit payments of current System members. Therefore, the long-term expected rate of return on System investments of 7.50% was applied to all periods of projected benefit payments to determine the TPL.

The FNP projections are based upon the System's financial status on the Measurement Date, the indicated set of methods and assumptions, and the requirements of GASB 67. As such, the FNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing plan basis, reflecting the impact of future members. Therefore, the results of this test do not necessarily indicate whether or not the funds will actually run out of money, the financial condition of the System, or the System's ability to make benefit payments in future years.

(c) **Long-term rate of return:** The long-term expected rate of return on pension plan investments is reviewed regularly as part of the experience study. The most recent experience analysis was performed and results provided on March 28, 2016 by the prior actuary, GRS Consultants. Generally, several factors are considered in evaluating the long-term rate of return assumption including long-term historical data, estimates inherent in current market data, and an analysis in which best-estimate ranges of expected future real rates of return (expected returns, net of investment expense and inflation), along with estimates of variability and correlations for each asset class, were developed by the System's investment consultant. These ranges were combined to develop the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and then adding expected inflation. The capital market assumptions developed by investment consultants are often intended for use over a 10-year investment horizon and are not always useful in setting the long-term rate of return for funding pension plans which covers a longer timeframe.

(d) **Municipal bond rate:** A municipal bond rate was not used in determining the discount rate. If it were required, the rate would be 3.56% on the Measurement Date.

(e) **Periods of projected benefit payments:** Projected future benefit payments for all current plan members were projected through 2116.

(f) **Assumed asset allocation**: The target asset allocation and best estimates of real rates of return for each major asset class will be supplied by the System.

(g) **Sensitivity analysis:** This paragraph requires disclosure of the sensitivity of the NPL to changes in the discount rate. The following presents the NPL of the System, calculated using the discount rate of 7.50 percent, as well as the System's NPL calculated using a discount rate that is 1-percentage-point lower (6.50 percent) or 1-percentage-point higher (8.50 percent) than the current rate:

	1% Decrease (6.50%)	Current Discount Rate (7.50%)	1% Increase (8.50%)
Net Pension Liability	$6,704,024,789	$5,206,915,597	$3,947,666,258

Paragraph 31.c.: The TPL at June 30, 2017 is based upon an actuarial valuation prepared as of June 30, 2017.

SECTION II – REQUIRED SUPPLEMENTARY INFORMATION

There are several tables of Required Supplementary Information (RSI) that need to be included in the System's financial statements:

> **Paragraphs 32.a.-c.:** The required tables of schedules are provided in Appendix A.
> **Paragraph 32.d.:** This information will be supplied by the System.

Paragraph 34: The following information should be noted regarding the RSI, particularly for the *Schedule of Employer Contributions*:

Changes of benefit and funding terms: The following changes were made by the Missouri Legislature and reflected in the valuation performed as of June 30 listed below:

2017: Senate Bill 62 (SB 62) made the following changes to the MSEP 2011 benefit provisions:

- Active members are now eligible for Normal Retirement at age 67 with 5 years of service (previously age 67 with 10 years of service).
- Active members are now eligible for Early Retirement at age 62 with 5 years of service (previously age 62 with 10 years of service).
- Active members are now vested after 5 years of service (previously 10 years of service).
- Cost-of-living adjustments for vested former members now commence on the second anniversary of the annuity starting date (previously commenced on first anniversary).
- Service credit for unused sick leave is only applied for members who terminate service at their early or normal retirement date.
- Survivor benefits for terminated vested members start at the date the member would have been eligible for normal retirement, not at date of death.

Changes in actuarial assumptions and methods:

6/30/2017 valuation:

- The investment return assumption was lowered from 7.65% to 7.50%.

6/30/2016 valuation:

- The long-term rate of return was lowered from 8.00% to 7.65%.

- Salary increases were changed from age based with increases between 3.2% and 5.9% to service based with increase between 3.25% and 8.75%.
- Post-retirement mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA to the RP-2014 healthy annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120%.
- Pre-retirement mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA and scaled by 100% for males and 80% for females to the RP-2014 employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females.
- The disabled mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA and set forward 10 years to the RP-2014 disabled mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females.
- Retirement rates were changed to better reflect actual experience of the System.
- The assumption for service credit for unused leave upon retirement and military service purchases was changed from 6 months to 8 months (4 months to 5 months for 2011 plan members).
- Withdrawal rates were changed to better reflect actual experience of the System.
- Disability rates were changed to better reflect actual experience of the System.
- Pre-retirement survivor benefits for spouse of terminated vested member liability loads were reduced.
- The married assumption at retirement was reduced from 75% to 70%.
- The married assumption for in-service deaths was reduced from 70% to 60%.
- The asset smoothing period changed from an open 3-year period to an open 5-year period.

6/30/2015 valuation:

- For the 2015 valuation only, the wage inflation was assumed to be 0% in the first year and 3% thereafter.

6/30/2014 valuation:

- The unfunded actuarial accrued liability amortization method was changed from a level percentage of payroll amortized over an open 30-year period to a level percentage of payroll amortized over a closed 30-year period beginning with the 6/30/2014 valuation.

Method and assumptions used in calculations of actuarially determined contributions.

The System is funded with contribution rates that are 4.00% of monthly salary for members hired on or after January 1, 2011 (0% for all other members) and an actuarially determined rate for the State of Missouri (subject to a minimum rate of 16.97% until the System is 80% funded on an actuarial basis). The Actuarially Determined Contributions in the *Schedule of Employer Contributions* are calculated as of the fiscal year two years prior to which contributions are reported.

The following actuarial methods and assumptions were used to determine the Actuarially Determined Contribution reported for the most recent Measurement Date, June 30, 2017 (based on the June 30, 2015 actuarial valuation):

Actuarial cost method	Entry Age Normal
Amortization method	Level percentage of payroll, closed
Remaining amortization period	29 years
Asset valuation method	Open 3-year smoothing based on actual market return and expected actuarial return
Price Inflation	2.50 percent
Payroll Growth	3.00 percent
Salary increases, including inflation	3.2 to 5.9 percent
Long-term Rate of Return, net of investment expense, including price inflation	8.00 percent
Cost-of-living adjustment	4.00%, compounded annually, when a minimum COLA of 4.00% is in effect. 2.00%, compounded annually, when no minimum COLA is in effect (80% of price inflation).

Please see the information presented earlier in regard to Paragraph 34 for detailed information on the benefit changes and assumption changes that may have impacted the Actuarially Determined Contributions shown in the *Schedule of Employer Contributions*.

APPENDIX A

REQUIRED SUPPLEMENTARY INFORMATION

Exhibit A

GASB 67 Paragraph 32(a) and (b)
SCHEDULE OF CHANGES IN THE EMPLOYERS' NET PENSION LIABILITY

	2017	2016	2015	2014
Total Pension Liability				
Service Cost	$152,766,134	$149,021,755	$150,412,577	$158,116,026
Interest	945,654,398	913,877,923	896,451,618	869,878,195
Benefit term changes	(1,696,059)	0	0	0
Differences between expected and actual experience*	(104,203,260)	61,150,083	(27,983,267)	12,376,237
Assumption changes	202,554,786	656,805,085	(57,568,553)	0
Benefit payments, including member refunds	(793,964,857)	(757,310,503)	(728,265,800)	(680,436,107)
Net change in Total Pension Liability	$401,111,142	$1,023,544,343	$233,046,575	$359,934,351
Total Pension Liability - beginning	$12,751,162,753	$11,727,618,410	$11,494,571,835	$11,134,637,484
Total Pension Liability - ending (a)	$13,152,273,895	$12,751,162,753	$11,727,618,410	$11,494,571,835
Plan Fiduciary Net Position				
Employer contributions	$335,217,422	$329,957,369	$329,752,832	$326,370,336
Employee contributions	25,439,343	21,684,920	18,099,455	14,025,328
Net investment income	272,595,668	1,740,269	(237,070,529)	1,485,159,992
Benefit payments, including member refunds	(793,964,857)	(757,310,503)	(728,265,800)	(680,436,107)
Administrative expenses	(8,759,341)	(8,489,375)	(8,077,692)	(7,336,922)
Other**	5,668,849	4,923,622	5,434,820	5,161,629
Net change in Plan Fiduciary Net Position	($163,802,916)	($407,493,698)	($620,126,914)	$1,142,944,256
Plan Fiduciary Net Position – beginning	$8,109,161,214	$8,516,654,912	$9,136,781,826	$7,993,837,570
Plan Fiduciary Net Position - ending (b)	$7,945,358,298	$8,109,161,214	$8,516,654,912	$9,136,781,826
Net Pension Liability - ending (a) - (b)	$5,206,915,597	$4,642,001,539	$3,210,963,498	$2,357,790,009
Plan Fiduciary Net Position as a percentage of the Total Pension Liability	60.41%	63.60%	72.62%	79.49%
Covered payroll	$1,975,353,105	$1,921,528,936	$1,918,527,768	$1,902,719,928
Employers' Net Pension Liability as a percentage of covered payroll	268.13%	241.58%	167.37%	123.92%

Note: Schedule is intended to show 10-year trend. Additional years will be reported as they become available.

* For 2017, includes ($88,518,832) in transition/actuarial software changes, $1,691,046 in member purchases of service credit and $3,977,803 in service transfer contributions.

** For 2017, includes $1,691,046 in member purchases of service credit and $3,977,803 in service transfer contributions.

Exhibit B

GASB 67 Paragraph 32(c)
SCHEDULE OF EMPLOYER AND NON-EMPLOYER CONTRIBUTIONS

	2017	2016	2015	2014
Actuarially determined employer contribution	$322,772,697	$329,957,369	$329,752,832	$326,370,336
Actual employer contributions	335,217,422	329,957,369	329,752,832	326,370,336
Annual contribution deficiency (excess)	($12,444,725)	$0	$0	$0
Covered payroll	$1,975,353,105	$1,921,528,936	$1,918,527,768	$1,902,719,928
Actual contributions as a percentage of covered payroll	16.97%	17.17%	17.19%	17.15%

Note: Information prior to 2017 was produced by the prior actuary.

APPENDIX B

SUMMARY OF BENEFIT PROVISIONS VALUED

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
DEFINITIONS		
Participants		
All MOSERS members, vested former members, retirees and survivors who first became members prior to July 1, 2000 and who do **not** elect to transfer to the MSEP 2000 plan. Election is made at the time benefits commence.	(1) All new employees who first become members on or after July 1, 2000, except full-time teaching and senior administrative personnel of the regional colleges and universities hired on or after July 1, 2002 who will be participants in the Colleges and Universities Retirement Plan (CURP). (2) MSEP active members and vested former members who elect to transfer to the MSEP 2000 plan prior to retirement. (3) MSEP retirees who elect to transfer to the MSEP 2000 plan during the election window from July 1, 2000 through June 30, 2001, and their survivors. (4) MSEP non-vested terminations rehired on or after July 1, 2000. (5) Members hired prior to January 1, 2011 participating in the CURP for six years may elect to change to MOSERS. Transferred service is for vesting purposes only.	(1) All new employees who first become employees on or after January 1, 2011, except full-time teaching and senior administrative personnel of the regional colleges and universities hired on or after July 1, 2002 who will be participants in the Colleges and Universities Retirement Plan (CURP). (2) Members hired on or after January 1, 2011 participating in the CURP for six years may elect to change to MOSERS. Transferred service is for vesting purposes only.

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
Final average earnings		
The average annual compensation of a member for the three consecutive years of service during which pay was highest (overtime pay is included for purposes of determining Average Compensation). Non-recurring lump sum payments are excluded. Unused sick leave may be converted to additional credited service (usable only for benefit computation, not eligibility).	The average annual compensation of a member for the three consecutive years of service during which pay was highest (overtime pay is included for purposes of determining Average Compensation). Non-recurring lump sum payments are excluded. Unused sick leave may be converted to additional credited service (usable only for benefit computation, not eligibility).	The average annual compensation of a member for the three consecutive years of service during which pay was highest (overtime pay is included for purposes of determining Average Compensation). Non-recurring lump sum payments are excluded. Unused sick leave may be converted to additional credited service (usable only for benefit computation, not eligibility).
Member contributions		
None.	Same as MSEP.	4.0% of salary, with interest credited to member contributions based on the 52-week Treasury bill rate (4% prior to June 30, 2014).

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
ELIGIBILITY FOR BENEFITS **Normal retirement**		
Members of the General Assembly: Age 55 with completion of at least 3 full biennial assemblies.	*Members of the General Assembly:* The earliest of attaining: (1) Age 55 with completion of at least 3 full biennial assemblies. (2) Age 50 with completion of at least 3 full biennial assemblies and with age plus credited service equal to 80 or more.	*Members of the General Assembly:* The earliest of attaining: (1) Age 62 with completion of at least 3 full biennial assemblies. (2) Age 55 with completion of at least 3 full biennial assemblies and with age plus credited service equal to 90 or more.
Statewide Elected Officials: The earliest of attaining: (1) Age 65 with at least 4 years of credited service. (2) Age 60 with at least 15 years of credited service. (3) Age 50 with age plus credited service equal to 80 or more.	*Statewide Elected Officials:* The earliest of attaining: (1) Age 55 with at least 4 years of credited service. (2) Age 50 with age plus credited service equal to 80 or more.	*Statewide Elected Officials:* The earliest of attaining: (1) Age 62 with at least 4 years of credited service as a statewide elected official. (2) Age 55 with age plus credited service equal to 90 or more.
General Employees: The earliest of attaining: (1) Age 65 and active with at least 4 years of credited service. (2) Age 65 with at least 5 years of credited service. (3) Age 60 with at least 15 years of credited service. (4) Age 48 with age plus credited service equal to 80 or more.	*General Employees:* The earliest of attaining: (1) Age 62 with at least 5 years of credited service. (2) Age 48 with age plus credited service equal to 80 or more.	*General Employees:* The earliest of attaining: (1) Age 67 with at least 10 years of credited service (5 years effective January 1, 2018). (2) Age 55 with age plus credited service equal to 90 or more.

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
Uniformed Water Patrol Employees: The earliest of attaining: (1) Age 55 and active with at least 4 years of credited service. (2) Age 55 with at least 5 years of credited service. (3) Age 48 with age plus credited service equal to 80 or more. *Administrative Law Judges:* The earliest of attaining: (1) Age 62 and active with at least 12 years of credited service. (2) Age 60 with at least 15 years of credited service. (3) Age 55 with at least 20 years of credited service.		
Early retirement for general employees		
Age 55 with at least 10 years of credited service.	Age 57 with at least 5 years of credited service.	Age 62 with at least 10 years of credited service (5 years effective January 1, 2018).

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
MONTHLY BENEFITS PAYABLE **Normal Retirement** *Members of the General Assembly:* $150 per month per biennial assembly served. *Statewide Elected Officials:* 1) Less than 12 years of credited service: 1.6% of Average Compensation times years of credited service. 2) 12 or more years of credited service: 50% of pay of the highest elected position held prior to retirement. *General Employees:* 1.6% of Average Compensation times years of credited service. 2.1% of Average Compensation times years of credited service for any period of non-social security covered employment transferred from the Public School Retirement System. *Uniformed Water Patrol:* 2.13% of Average Compensation times years of credited service.	*Members of the General Assembly:* 1/24 of pay times first 24 years of credited service as a member of the General Assembly. *Statewide Elected Officials:* 1/24 of pay (of the highest elected position held prior to retirement) times the first 12 years of credited service as a statewide elected official. *General Employees:* 1.7% of Average Compensation times years of credited service. Temporary Benefit: If member retires between ages 48 and 62 with age plus credited service equal to 80 or more, a temporary benefit is payable until the attainment of the minimum age at which reduced social security benefits are payable, in the amount of 0.8% of Average Compensation times years of credited service.	*Members of the General Assembly:* 1/24 of pay times first 24 years of credited service as a member of the General Assembly. *Statewide Elected Officials:* 1/24 of pay (of the highest elected position held prior to retirement) times the first 12 years of credited service as a statewide elected official. *General Employees:* 1.7% of Average Compensation times years of credited service. Temporary Benefit: If member retires between ages 55 and 62 with age plus credited service equal to 90 or more, a temporary benefit is payable until the attainment of the minimum age at which reduced social security benefits are payable, in the amount of 0.8% of Average Compensation times years of credited service.

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
Administrative Law Judges: 50% of Compensation	Non-Social Security Covered Service: 2.5% of Average Compensation times years of credited service for any period of non-social security covered employment transferred from the Public School Retirement System.	Non-Social Security Covered Service: 2.5% of Average Compensation times years of credited service for any period of non-social security covered employment transferred from the Public School Retirement System.
Early retirement for general employees Normal retirement amount reduced by ½% for each month that retirement precedes eligibility for normal retirement. 1) Less than 15 years of service: Normal retirement amount actuarially reduced for years younger than age 65. 2) 15 years but less than 20 years of service, and less than the number of years of service necessary for age and service to total 80: Normal retirement amount actuarially reduced for years younger than age 60. 3) 20 or more years of service, but less than the number of years of service necessary for age and service to total 80: Normal retirement amount reduced for years younger than the 80 and out eligibility date.	Normal retirement amount reduced by ½% for each month that retirement precedes eligibility for normal retirement, age 62.	Normal retirement amount reduced by ½% for each month that retirement precedes eligibility for normal retirement, age 67.

MSEP (Missouri State Employees' Plan)

Vested deferred benefits

Benefits for employees who terminate prior to eligibility for an immediate benefit are considered to be vested in accordance with the following schedule (benefits commence at the age the individual would have been eligible for early or normal retirement, considering years of credited service). Unused sick leave is not converted.

Years of Service	General Assembly	Elected Officials	General Employees
4		100%	
5			100%
6*	100%		

*3 Assemblies

Death prior to retirement

The surviving spouse benefit is computed as if the member had been normal retirement age on the date of death and elected the joint and 100% survivor optional form of payment, provided the member had at least 5 years of credited service and was married on the date of death. If no eligible spouse survives, 80% of the member's life income annuity is paid to eligible children until age 21. If the death is duty related, the service requirement is waived and the minimum

MSEP 2000 (Missouri State Employees' Plan 2000)

Benefits for employees who terminate prior to eligibility for an immediate benefit are considered to be vested in accordance with the following schedule (benefits commence at age 57 for early retirement or 62 for normal retirement). Unused sick leave is converted. CURP to MOSERS transfers with 6 years of service are immediately vested.

Years of Service	General Assembly	Elected Officials	General Employees
4		100%	
5			100%
6*	100%		

*3 Assemblies, HB1455 prospectively

The surviving spouse benefit is computed as if the member had been normal retirement age on the date of death and elected the joint and 100% survivor optional form of payment, provided the member had at least 5 years of credited service (3 full assemblies for a member of the General Assembly, 4 years of credited service for a statewide elected official). If no eligible spouse survives, 80% of the member's life income annuity is paid to eligible children until age 21. If the death is duty related, the

MSEP 2011 (Missouri State Employees' Plan 2011)

Benefits for employees who terminate prior to eligibility for an immediate benefit are considered to be vested in accordance with the following schedule (benefits commence at age 67 normal retirement). Unused sick leave is not converted for any new deferred vested members on or after January 1, 2018.

Years of Service	General Assembly	Elected Officials	General Employees
4		100%	
6*	100%		
10**			100%

*3 Assemblies, HB1455 prospectively
**5 years of service for General Employees on or after January 1, 2018.

The surviving spouse benefit is computed as if the member had been normal retirement age on the date of death* and elected the joint and 100% survivor optional form of payment, provided the member had at least 5 years of credited service (2 full assemblies for a member of the General Assembly, 4 years of credited service for a statewide elected official). If no eligible spouse survives, 80% of the member's life income annuity is paid to eligible children until age 21. If the death is duty related, the

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
spouse benefit is 50% of Average Compensation (rate of compensation for members of the General Assembly).	service requirement is waived and the minimum spouse benefit is 50% of Average Compensation (rate of compensation for members of the General Assembly).	service requirement is waived and the minimum spouse benefit is 50% of Average Compensation (rate of compensation for members of the General Assembly). *Effective January 1, 2018, the surviving spouse benefit for terminated vested participants is payable when member would have reached normal retirement age.
Death after retirement		
50% of the benefit the retired member was receiving on the date of death (the normal form of payment), or the benefit payable under the joint and survivor or period certain form of payment, if the member elected an optional form of payment at time of retirement and provided the member was married on their date of retirement. Effective July 1, 2000, a member who is not married at retirement but marries thereafter may designate a spouse as beneficiary within one year of marriage. Additionally, a member may designate a new spouse as beneficiary within one year of marriage in the event of the death of the spouse the member was married to at the date of retirement (this provision does not apply to period certain annuities).	The benefit payable under the joint and survivor or period certain form of payment, if the member elected an optional form of payment at time of retirement. A member who is not married at retirement but marries thereafter may designate a spouse as beneficiary within one year of marriage. Additionally, a member may designate a new spouse as beneficiary within one year of marriage in the event of the death of the spouse the member was married to at the date of retirement (this provision does not apply to period certain annuities).	The benefit payable under the joint and survivor or period certain form of payment, if the member elected an optional form of payment at time of retirement. A member who is not married at retirement but marries thereafter may designate a spouse as beneficiary upon completion of one year of marriage. Additionally, a member may designate a new spouse as beneficiary upon completion of one year of marriage in the event of the death of the spouse the member was married to at the date of retirement (this provision does not apply to period certain annuities).

<table>
<tr><th>MSEP
(Missouri State Employees’ Plan)</th><th>MSEP 2000
(Missouri State Employees’ Plan 2000)</th><th>MSEP 2011
(Missouri State Employees’ Plan 2011)</th></tr>
<tr><td>Disability</td><td></td><td></td></tr>
<tr><td>Normal retirement benefits become payable at the time the member is eligible for normal retirement, and are computed based on: i) the service that would have accrued to the member if active employment had continued; and ii) the member's rate of pay at the time of disability (if the member retires on or after August 28, 1999, the member’s rate of pay is based on the rate of pay at the time of disability indexed to the time of benefit commencement). An exception is Uniformed Water Patrol employees who are eligible for an immediate occupational disability benefit equal to 50% of pay at time of disability.</td><td>Normal retirement benefits become payable at the time the member is eligible for normal retirement, and are computed based on: i) the service that would have accrued to the member if active employment had continued; and ii) the member's rate of pay at the time of disability indexed to the time of benefit commencement. The annual percentage increase in the pay used to compute benefits is the lesser of: i) 80% of the CPI increase and ii) 5%.</td><td>Normal retirement benefits become payable at the time the member is eligible for normal retirement, and are computed based on: i) the service that would have accrued to the member if active employment had continued; and ii) the member's rate of pay at the time of disability indexed to the time of benefit commencement. The annual percentage increase in the pay used to compute benefits is the lesser of: i) 80% of the CPI increase and ii) 5%.</td></tr>
<tr><td>Post-retirement benefit adjustments</td><td></td><td></td></tr>
<tr><td>Benefits are increased to retired members (including survivors) annually in accordance with the following formulas:
<table>
<tr><th>Increase in CPI</th><th>Formula 1 Benefit Increase</th><th>Formula 2 Benefit Increase</th></tr>
<tr><td>5.00% or less</td><td>4%</td><td>80% of CPI increase</td></tr>
<tr><td>5.01% - 6.24%</td><td>80% of CPI increase</td><td>80% of CPI increase</td></tr>
<tr><td>6.25% or more</td><td>5%</td><td>5%</td></tr>
</table></td><td>Benefits are increased to retired members (including survivors) annually in accordance with the following:

Members of the General Assembly:
Benefit is adjusted annually based on the increase in the pay for an active member of the General Assembly.</td><td>Benefits are increased to retired members (including survivors) annually in accordance with the following:

Members of the General Assembly:
Benefit is adjusted annually based on the increase in the pay for an active member of the General Assembly.</td></tr>
</table>

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
Members first hired prior to August 28, 1997 receive COLAs based on Formula 1 until an aggregate increase of 65% is reached. At that point subsequent COLAs based on Formula 2 are granted. Members first hired on or after August 28, 1997 receive COLAs based solely on Formula 2. Statewide Elected Officials with 12 or more years of service have their benefit adjusted annually based on the increase in the pay for an active statewide elected official in the member's highest elected position. Members who are fully vested and work beyond age 65 will have their monthly benefit increased upon retirement. The percentage increase in benefit is equal to all COLAs for the years between age 65 and date of retirement, not to exceed 65% and counts toward the Formula 1 65% maximum.	*Statewide Elected Officials:* Benefit is adjusted annually based on the increase in the pay for an active statewide elected official in the retired member's highest elected position. *General Employees:* Annual benefit percentage increase equal to the lesser of: i) 80% of the CPI increase, and 5%. CPI: For the basis of determining CPI, the average monthly reported CPI for the prior calendar year is divided by the average monthly reported CPI for the second prior calendar year to determine the current year increases, if any. If this amount is less than one, benefits are not reduced, nor is there any cumulative effect on future years determination of CPI. Timing of Increase: Benefits are adjusted on the anniversary of the effective date of retirement for most members. Members retiring under the BackDROP provisions have an anniversary based on the retroactive starting date for the BackDROP.	*Statewide Elected Officials:* Benefit is adjusted annually based on the increase in the pay for an active statewide elected official in the retired member's highest elected position. *General Employees:* Annual benefit percentage increase equal to the lesser of: i) 80% of the CPI increase, and 5%. CPI: For the basis of determining CPI, the average monthly reported CPI for the prior calendar year is divided by the average monthly reported CPI for the second prior calendar year to determine the current year increases, if any. If this amount is less than one, benefits are not reduced, nor is there any cumulative effect on future years determination of CPI. Timing of Increase: Benefits are adjusted on the anniversary of the effective date of retirement.

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
Pop-up provision		
Benefits to members who choose a survivor form of payment and whose spouse precedes the member in death, will "pop-up" or revert to the amount the member would have received had he/she not elected a survivor option.	Same.	Same.
Portability		
Purchase/Transfer Provisions (in addition to military). Effective August 28, 1999, a member may purchase up to four years of non-federal full-time Missouri public service, provided the member is not vested in another retirement system for that same service.	Purchase/Transfer Provisions (in addition to military). A member may purchase up to four years of non-federal full-time Missouri public service, provided the member is not vested in another retirement system for that same service. Local vested service credit granted after 10 years of state service if the other retirement plan agrees to transfer assets equal to the accrued liability to MOSERS.	May purchase qualifying public sector service at full actuarial cost.

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
BackDROP		
To be eligible to participate in the BackDROP, a member must have been eligible to retire under normal retirement age and/or service conditions for at least two years. A retroactive starting date is established for BackDROP purposes which is the later of: 1) the member's normal retirement date or 2) five years prior to the annuity starting date under the retirement plan selected by the member. A member may elect the BackDROP period for the accumulation of the BackDROP account in 12 month increments prior to their actual retirement date or back to the earliest possible date. This results in a BackDROP period of one to five years depending upon the individual situation. A theoretical BackDROP account is accumulated that includes 90% of the value of the benefit payments that would have been paid during the BackDROP period had the member retired at the retroactive starting date with their respective option election. These payments include applicable post-retirement benefit increases.	Same as MSEP.	Not eligible for the BackDROP.

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
The member is paid the resulting lump sum value of the BackDROP account as of the annuity starting date or as three equal annual installments beginning at the annuity starting date. The annuity benefit payable from the actual retirement date is computed with years of service and average pay as of the retroactive starting date for the BackDROP. Post-retirement benefit increases that occurred during the BackDROP period are applied in the calculation of the monthly annuity.		

APPENDIX C

STATEMENT OF ACTUARIAL ASSUMPTIONS

ACTUARIAL ASSUMPTIONS

Economic Assumptions

1. Long-term Rate of Return — 7.50%, compounded annually, net of investment expenses. *(7.65% in June 30, 2016 valuation)*

2. Inflation — 2.50% per year

3. Salary Increases — Rates vary by service. Sample rates are as follows:

Rates by Service	
Years	Rate
1	8.75 %
2	5.50
3	4.50
4	4.25
5	4.00
9	3.75
10	3.50
25+	3.25

4. Payroll Growth — 3.00% per year

5. Cost-of-Living Adjustment (COLA) — 4.00% on a compounded basis when a minimum COLA of 4.00% is in effect. 2.00% on a compounded basis when no minimum COLA is in effect.

6. Interest on Member Contributions — 1.50% per year

Demographic Assumptions

1. Mortality — The mortality assumption includes an appropriate level of conservatism that reflects expected future mortality improvement.

   a. Post-retirement — RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120%

   b. Pre-retirement — RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females

c. Long-term disability

RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females

2. Retirement Assumption

	Normal Retirement				Early Retirement		
	MSEP and MSEP 2000*			MSEP 2011**		MSEP and MSEP 2000	MSEP 2011
Retirement Age	Percent Retiring 1st Year	Percent Retiring 2nd Year	Percent Retiring 3rd Year	Percent Retiring	Retirement Age	Percent Retiring	Percent Retiring
48	20 %						
49	20	10 %					
50	20	10	21 %				
51	20	10	21				
52	20	10	21				
53	20	10	21				
54	20	10	21				
55	20	10	21	45 %			
56	20	10	21	45			
57	20	10	21	35	57	2.4 %	
58	20	10	21	35	58	3.1	
59	20	10	21	30	59	3.0	
60	20	10	21	35	60	5.1	
61	19	10	21	25	61	6.0	
62	18	22	29	40	62	6.0	10 %
63	16	18	24	30	63	6.0	10
64	15	17	17	20	64	6.0	10
65	19	19	27	30	65		50
66	24	25	28	25	66		50
67	10	25	23	20	67		
68	20	25	23	20	68		
69	20	25	23	20	69		
70	20	25	23	20	70		
71	20	25	23	20	71		
72	20	25	23	20	72		
73	20	25	23	20	73		
74	20	25	23	20	74		
75	50	50	23	50	75		
76	50	50	23	50	76		
77	75	75	23	75	77		
78	100	100	100	100	78		

** For members hired prior to January 1, 2011.*
*** For members hired on or after January 1, 2011.*

3 Termination From Active Employment

Sample Age	Years of Service	Percent of Active Members Separating within the Next Year Termination** Males	Termination** Females	Death* Males	Death* Females	Disability Males	Disability Females
	0-1	24.0 %	27.5 %				
	1-2	19.0	21.5				
	2-3	15.5	16.3				
	3-4	13.3	13.5				
	4-5	11.2	11.3				
25	5+	13.5 %	14.0 %	0.03 %	0.01%	0.10 %	0.10 %
30		10.6	11.0	0.03	0.02	0.10	0.10
35		8.2	8.5	0.04	0.03	0.10	0.10
40		5.8	6.0	0.05	0.03	0.36	0.36
45		4.3	4.5	0.07	0.05	0.41	0.41
50		2.9	3.0	0.13	0.08	0.57	0.57
55		2.9	3.0	0.22	0.14	0.77	0.77
60		2.9	3.0	0.40	0.20	1.02	1.02
65		2.9	3.0	0.70	0.30	1.23	1.23
70		2.9	3.0	1.17	0.50	1.23	1.23

** The pre-retirement mortality table used was the RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females. 2% of the deaths in active service are assumed to be duty related.*
*** Does not apply to Elected Officials and Legislators.*

Elected Officials and Legislators

Years of Service	Percent of Active Members Separating within the Next Year Termination Male/Female
0-1	8.0 %
1-2	8.0
2-3	8.0
3-4	8.0
4-5	12.0
5-6	12.0
6-7	12.0
7+	35.0

Other Assumptions

1. Form of Payment — MSEP – 50% joint and survivor
   MSEP 2000 and MSEP 2011 – Straight life annuity

2. Marital Status

   a. Percent married — 70% married at retirement, 60% of those dying in active service are married

   b. Spouse's age — Females assumed to be three years younger than males.

3. Pay Increase Timing — Beginning of the fiscal year.

4. Decrement Timing — Decrements of all types are assumed to occur mid-year.

5. Eligibility Testing — Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.

6. Benefit Service — Exact fractional service is used to determine the amount of the benefit payable.

7. Decrement Relativity — Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.

8. Decrement Operation — Disability and withdrawal do not operate during normal retirement eligibility.

9. Other Liability Adjustments — Pre-Retirement Survivor Benefits for Spouse of Terminated Vested Member

Age	Male/Female
<30	1.57/1.31
30-39	1.24/1.13
40-49	1.09/1.05
>50	1.02/1.01

   These factors are used to estimate the cost of immediate unreduced survivor annuities upon the death of a vested member.

10. Incidence of Contributions — Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made. New entrant normal cost

	contributions are applied to the funding of new entrant benefits.
11. MSEP 2000 Election	All regular state employees hired on or before June 30, 2000 are assumed to elect MSEP 2000 prior to age 62 and MSEP on or after age 62. Elected Officials, General Assembly, and Uniformed Water Patrol Members hired before July 1, 2000 and Administrative Law Judges hired before April 26, 2005 are assumed to elect MSEP at retirement.
12. Service Adjustment	It is assumed that each member will be granted 8 months of service credit, 4 months for unused leave upon retirement and 4 months for military service purchases. For members hired on or after January 1, 2011 it is assumed that each member will be granted 5 months for unused leave.
13. Forfeitures	MSEP - For those hired on or after January 1, 2011, 50% of state employees terminating at first vesting eligibility are assumed to take a refund and forfeit their deferred pension. This percentage decreases to 0% at first retirement eligibility.
14. Salary and Benefit Limits	For purposes of the valuation, no limits were applied to member compensation or benefits.
15. Commencement age for deferred vested benefit	Normal Retirement Date

Data Adjustments

Active and retired member data was reported as of May 31, 2017. It was brought forward to June 30, 2017 by adding one month of service for all active members and the June COLA for certain retired members. Financial information continues to be reported as of June 30. This procedure was instituted to provide sufficient time for the Board of Trustees to certify the appropriate contribution rate prior to the October 1 statutory deadline.

Active members reported with less than a $100 annualized salary were assumed to receive the average active member pay.

When the option of choosing plans is available, terminated vested members are reported with two records, one with benefits under the MSEP plan and one with benefits under the MSEP 2000 plan. Because it is unknown what the member will elect at retirement, both records are valued and the plan that produces the higher present value of future benefits is used for valuation purposes.

For any retired member who has elected a joint and survivor benefit yet has no beneficiary date of birth provided, it was assumed that the beneficiary is 3 years younger for male retirees and 3 years older for female retirees.

For members reported with no gender, the member is assumed to be male.

Due to limitations in our valuation program, members who are not eligible for normal retirement prior to age 85 had their date of birth adjusted.

TECHNICAL VALUATION PROCEDURES

Other Valuation Procedures

Salary increases are assumed to apply to annual amounts.

Decrements are assumed to occur mid-year, except that immediate retirement is assumed for those who are at or above the age at which retirement rates are 100%. Standard adjustments are made for multiple decrements.

No actuarial liability is included for participants who terminated without being vested prior to the valuation date, except those due a refund of contributions.

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CONSULTING, LLC

The experience and dedication you deserve

GASB STATEMENT NO. 67 REPORT

FOR THE

MISSOURI STATE EMPLOYEES'

RETIREMENT SYSTEM

JUDGES

PREPARED AS OF JUNE 30, 2017

Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve

October 10, 2017

Board of Trustees
Missouri State Employee' Retirement System
907 Wildwood Drive
Jefferson City, Missouri 65109

Dear Board Members:

Presented in this report is information to assist the Missouri State Employees' Retirement System in meeting the requirements of the Governmental Accounting Standards Board (GASB) Statement No. 67 for the Judges plan. The information is presented for the June 30, 2017 Measurement Date. The calculations in this report have been made on a basis that is consistent with our understanding of this accounting standard (GASB 67). Please note that the discount rate used to determine the Total Pension Liability changed from 7.65% at the Prior Measurement Date to 7.50% at the current Measurement Date.

The annual actuarial valuation used as a basis for much of the information presented in this report was performed as of June 30, 2017. The valuation was based upon data, furnished by the System's staff, concerning active, inactive and retired members along with pertinent financial information. This information was reviewed for completeness and internal consistency, but was not audited by us. The valuation results depend on the integrity of the data. If any of the information is inaccurate or incomplete, our results may be different and our calculations may need to be revised. Please see the actuarial valuation for additional details on the funding requirements for the System including actuarial assumptions and methods and the funding policy.

To the best of our knowledge, the information contained in this report is complete and accurate. The calculations were performed by qualified actuaries according to generally accepted actuarial principles and practices, as well as in conformity with Actuarial Standards of Practice issued by the Actuarial Standards Board. The calculations are based on the current provisions of the System, and on actuarial assumptions that are internally consistent and individually reasonable based on the actual experience of the System. In addition, the calculations were completed in compliance with applicable law and, in our opinion, meet the requirements of GASB 67.

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These results are only for financial reporting and may not be appropriate for funding purposes or other types of analysis. Calculations for purposes other than satisfying the requirements of GASB 67 may produce significantly different results. Future actuarial results may differ significantly from the current results presented in this report due to such factors as changes in plan experience or changes in economic or demographic assumptions.

We, Patrice A. Beckham, FSA, Joseph A. Nichols, ASA and Bryan K. Hoge, FSA, are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein. We are available to answer any questions on the material contained in this report or to provide explanations or further details as may be appropriate.

Respectfully submitted,

Patrice Beckham

Joseph A. Nichols

Patrice A. Beckham, FSA, EA, FCA, MAAA
Principal and Consulting Actuary

Joseph A. Nichols, ASA, EA, MAAA, MSPA
Consulting Actuary

Bryan K. Hoge, FSA, EA, FCA, MAAA
Senior Actuary

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REPORT OF THE ANNUAL GASB STATEMENT NO. 67

MISSOURI STATE EMPLOYEES' RETIREMENT SYSTEM

SUMMARY OF PRINCIPAL RESULTS

Valuation Date (VD):	June 30, 2017
Prior Measurement Date:	June 30, 2016
Measurement Date (MD):	June 30, 2017
Membership Data:	
Retirees and Beneficiaries	559
Inactive Vested Members	26
Inactive Nonvested Members	0
Active Employees	410
Total	995
Single Equivalent Interest Rate (SEIR):	
Long-Term Expected Rate of Return	7.50%
Municipal Bond Index Rate at Prior Measurement Date	2.85%
Municipal Bond Index Rate at Measurement Date	3.56%
Year in which Fiduciary Net Position is Projected to be Depleted	N/A
Single Equivalent Interest Rate at Prior Measurement Date	7.65%
Single Equivalent Interest Rate at Measurement Date	7.50%
Net Pension Liability:	
Total Pension Liability (TPL)	$564,417,925
Fiduciary Net Position (FNP)	137,634,941
Net Pension Liability (NPL = TPL – FNP)	$426,782,984
FNP as a percentage of TPL	24.39%

INTRODUCTION

The Governmental Accounting Standards Board issued Statement No. 67 (GASB 67), *Financial Reporting for Pension Plans*, in June 2012. The effective date for reporting under GASB 67 for the Missouri State Employees' Retirement System for Judges was the fiscal year ending June 30, 2014. Based on the provisions of GASB 67, the Missouri State Employees' Retirement System for Judges (Judges or System) is a single-employer defined benefit pension plan.

This report, prepared as of June 30, 2017 (the Measurement Date), presents information to assist the System in meeting the requirements of GASB 67. Much of the material provided in this report is based on the data, assumptions and results of the annual funding actuarial valuation of the System performed as of June 30, 2017 (the Valuation Date). The results of that valuation were detailed in a report dated September 11, 2017.

GASB 67 discloses the Total Pension Liability (TPL) utilizing the Entry Age Normal actuarial cost method. The Net Pension Liability (NPL) is equal to the TPL minus the System's Fiduciary Net Position (FNP) (basically the fair (market) value of assets). The benefit provisions recognized in the calculation of the TPL are summarized in Appendix B.

Among the items needed for the liability calculation is the discount rate, or Single Equivalent Interest Rate (SEIR), as described by GASB 67. To determine the SEIR, the FNP must be projected, using GASB 67 guidelines, into the future for as long as there are anticipated benefits payable under the plan's provisions applicable to the members and beneficiaries of the System on the Measurement Date. If the FNP is not projected to be depleted at any point in the future, the long-term expected rate of return on plan investments expected to be used to finance the benefit payments may be used as the SEIR.

If, however, the FNP is projected to be depleted at a future measurement date, the SEIR is determined as the single rate that will generate a present value of benefit payments equal to the sum of the present value determined by discounting all projected benefit payments through the date of depletion by the long-term expected rate of return, and the present value determined by discounting those benefits after the date of depletion by a 20-year tax-exempt municipal bond (rating AA/Aa or higher) rate. The rate used, if necessary, for this purpose is the monthly average of the Bond Buyers General Obligation 20-year Municipal Bond Index Rate (formerly published monthly by the Board of Governors of the Federal Reserve System).

Our calculations indicate that the FNP is not projected to be depleted, so the Municipal Bond Index Rate is not used in the determination of the SEIR for either the June 30, 2016 or the June 30, 2017

TPL. The SEIR for the Measurement Date is 7.50%, the long-term assumed rate of return on investments. The SEIR for the Prior Measurement Date was 7.65%. Please see Paragraph 31.b.(1) for more explanation of the development of the SEIR.

The FNP projections are based upon the System's financial status on the Measurement Date, the indicated set of methods and assumptions, and the requirements of GASB 67. As such, the FNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing plan basis, reflecting the impact of future members. Therefore, the results of this test do not necessarily indicate whether or not the System will actually run out of money, the financial condition of the System, or the System's ability to make benefit payments in future years.

The sections that follow provide the results of all the necessary calculations, presented in the order presented in GASB 67 for note disclosure and Required Supplementary Information (RSI).

SECTION I – NOTES TO FINANCIAL STATEMENTS

The material presented herein will follow the order presented in GASB 67. Paragraph numbers are provided for ease of reference.

Paragraphs 30.a. (1)-(3): This information will be supplied by the System.

Paragraph 30.a. (4): The data required regarding the membership of the System were furnished by the System. The following table summarizes the membership of the System as of June 30, 2017, the date of the valuation used to determine the June 30, 2017 TPL.

Membership

Number as of June 30, 2017	
Inactive Members Or Their Beneficiaries Currently Receiving Benefits	559
Inactive Members Entitled To But Not Yet Receiving Benefits	26
Inactive Nonvested Members	0
Active Members	410
Total	995

Paragraphs 30.a. (5)-(6) and Paragraphs 30.b.-f.: This information will be supplied by the System.

Paragraph 31.a. (1)-(4): As stated earlier, the NPL is equal to the TPL minus the FNP. That result, as of June 30, 2017, is presented in the following table.

Fiscal Year Ending June 30, 2017		
Total Pension Liability	$	564,417,925
Fiduciary Net Position		137,634,941
Net Pension Liability	$	426,782,984
Ratio of Fiduciary Net Position to Total Pension Liability		24.39%

Paragraph 31.b.: This paragraph requires information to be disclosed regarding the actuarial assumptions and other inputs used to measure the TPL. The complete set of actuarial assumptions and other inputs utilized in developing the TPL are outlined in Appendix C. The TPL as of June 30, 2017 was determined based on an actuarial valuation prepared as of June 30, 2017, using the following key actuarial assumptions and other inputs:

Price Inflation	2.50 percent
Payroll Growth	3.00 percent
Salary increases, including wage inflation	3.00 to 5.20 percent
Long-term Rate of Return, net of investment expense, including price inflation	7.50 percent
Municipal Bond Index Rate	
Prior Measurement Date	2.85 percent
Measurement Date	3.56 percent
Year FNP is projected to be depleted	N/A
Single Equivalent Interest Rate, net of investment expense, including price inflation	
Prior Measurement Date	7.65 percent
Measurement Date	7.50 percent

Cost-of-living adjustment	4.00%, compounded annually, when a minimum COLA of 4.00% is in effect. 2.00%, compounded annually, when no minimum COLA is in effect (80% of price inflation).
Mortality	Pre-retirement mortality rates were based on the RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015. Post-retirement mortality rates were based on the RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 98%.

Disabled mortality rates were based on the RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015.

The actuarial assumptions used in the valuation are based on the results of the most recent actuarial experience study, which covered the five-year period ending June 30, 2015. The experience study report, performed by the prior actuary, is dated March 30, 2016.

Paragraph 31.b.(1)

(a) Discount rate (SEIR): The discount rate used to measure the TPL at June 30, 2017 was 7.50%. The discount rate used to measure the TPL at the Prior Measurement Date was 7.65%.

(b) Projected cash flows: The projection of cash flows used to determine the discount rate assumed that plan contributions from members and the State of Missouri will be made at the contribution rates as set in state statute:

a. Employee contribution rate: 4.00% of salary for members hired on or after 1/1/2011; no contributions for members hired before 1/1/2011.
b. Employer contribution rate: The actuarial required contribution rate including a minimum contribution rate that shall not fall below the rate set for fiscal year 2015 (58.45%), until the plan is at least 80% funded.
c. Administrative expenses in the prior year were projected forward with price inflation as an estimate for administrative expenses in the current and future years. The portion of expenses in future years allocated to the current members was based on the proportionate share of covered payroll in each year for the remainder of the existing members to the total covered payroll for all members.

Based on those assumptions, the System's FNP was projected to be available to make all projected future benefit payments of current System members. Therefore, the long-term expected rate of return on System investments of 7.50% was applied to all periods of projected benefit payments to determine the TPL.

The FNP projections are based upon the System's financial status on the Measurement Date, the indicated set of methods and assumptions, and the requirements of GASB 67. As such, the FNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing plan basis, reflecting the impact of future members. Therefore, the results of this test do not necessarily indicate whether or not the funds will actually run out of money, the financial condition of the System, or the System's ability to make benefit payments in future years.

(c) **Long-term rate of return:** The long-term expected rate of return on pension plan investments is reviewed regularly as part of the experience study. The most recent experience analysis was performed and results provided on March 30, 2016 by the prior actuary, GRS Consultants. Generally, several factors are considered in evaluating the long-term rate of return assumption including long-term historical data, estimates inherent in current market data, and an analysis in which best-estimate ranges of expected future real rates of return (expected returns, net of investment expense and inflation), along with estimates of variability and correlations for each asset class, were developed by the System's investment consultant. These ranges were combined to develop the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and then adding expected inflation. The capital market assumptions developed by investment consultants are often intended for use over a 10-year investment horizon and are not always useful in setting the long-term rate of return for funding pension plans which covers a longer timeframe.

(d) **Municipal bond rate:** A municipal bond rate was not used in determining the discount rate. If it were required, the rate would be 3.56% on the Measurement Date.

(e) **Periods of projected benefit payments:** Projected future benefit payments for all current plan members were projected through 2116.

(f) **Assumed asset allocation**: The target asset allocation and best estimates of real rates of return for each major asset class will be supplied by the System.

(g) **Sensitivity analysis:** This paragraph requires disclosure of the sensitivity of the NPL to changes in the discount rate. The following presents the NPL of the System, calculated using the discount rate of 7.50 percent, as well as the System's NPL calculated using a discount rate that is 1-percentage-point lower (6.50 percent) or 1-percentage-point higher (8.50 percent) than the current rate:

	1% Decrease (6.50%)	Current Discount Rate (7.50%)	1% Increase (8.50%)
Net Pension Liability	$484,552,509	$426,782,984	$377,354,336

Paragraph 31.c.: The TPL at June 30, 2017 is based upon an actuarial valuation prepared as of June 30, 2017.

SECTION II – REQUIRED SUPPLEMENTARY INFORMATION

There are several tables of Required Supplementary Information (RSI) that need to be included in the System's financial statements:

> **Paragraphs 32.a.-c.:** The required tables of schedules are provided in Appendix A.
> **Paragraph 32.d.:** This information will be supplied by the System.

Paragraph 34: The following information should be noted regarding the RSI, particularly for the *Schedule of Employer Contributions*:

Changes of benefit and funding terms: The following changes were made by the Missouri Legislature and reflected in the valuation performed as of July 1 listed below:

None

Changes in actuarial assumptions and methods:

6/30/2017 valuation:

- The investment return assumption was lowered from 7.65% to 7.50%.

6/30/2016 valuation:

- The long-term rate of return was lowered from 8.00% to 7.65%.
- Post-retirement mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA to the RP-2014 healthy annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 98%.
- Pre-retirement mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA to the RP-2014 employee mortality table, projected from 2006 to 2026 with Scale MP-2015.
- The disabled mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA and set forward 10 years to the RP-2014 disabled mortality table, projected from 2006 to 2026 with Scale MP-2015.
- Retirement rates were changed to better reflect actual experience of the System.
- Withdrawal rates were changed to better reflect actual experience of the System.

- The marriage assumption at retirement was increased from 70% to 80%.
- The marriage assumption for in-service deaths was increased from 70% to 80%.
- The asset smoothing period changed from an open 3-year period to an open 5-year period.

6/30/2014 valuation:

- For the 2014 valuation only, a one-time adjustment to the payroll growth from 3.00% to 14.38% was assumed for the year after the valuation date to reflect the average planned salary increase for 2015.
- The unfunded actuarial accrued liability amortization method was changed from a level percentage of payroll amortized over an open 30-year period to a level percentage of payroll amortized over a closed 30-year period beginning with the 6/30/2014 valuation.

Method and assumptions used in calculations of actuarially determined contributions.

The System is funded with contribution rates that are 4.00% of monthly salary for members hired on or after January 1, 2011 (0% for all other members) and an actuarially determined rate for the State of Missouri (subject to a minimum rate of 58.45% until the System is 80% funded on an actuarial basis). The Actuarially Determined Contributions in the *Schedule of Employer Contributions* are calculated as of the fiscal year two years prior to which contributions are reported.

The following actuarial methods and assumptions were used to determine the Actuarially Determined Contribution reported for the most recent Measurement Date, June 30, 2017 (based on the June 30, 2015 actuarial valuation):

Actuarial cost method	Entry Age Normal
Amortization method	Level percentage of payroll, closed
Remaining amortization period	29 years
Asset valuation method	Open 3-year smoothing based on actual market return and expected actuarial return
Price Inflation	2.50 percent
Payroll Growth	3.00 percent
Salary increases, including inflation	3.00 to 5.20 percent
Long-term Rate of Return, net of investment expense, including price inflation	8.00 percent
Cost-of-living adjustment	4.00%, compounded annually, when a minimum COLA of 4.00% is in effect. 2.00%, compounded annually, when no minimum COLA is in effect (80% of price inflation).

Please see the information presented earlier in regard to Paragraph 34 for detailed information on the benefit changes and assumption changes that may have impacted the Actuarially Determined Contributions shown in the *Schedule of Employer Contributions*.

APPENDIX A

REQUIRED SUPPLEMENTARY INFORMATION

Exhibit A

GASB 67 Paragraph 32(a) and (b)
SCHEDULE OF CHANGES IN THE EMPLOYERS' NET PENSION LIABILITY

	2017	2016	2015	2014
Total Pension Liability				
Service Cost	$12,945,567	$10,932,097	$10,613,686	$8,990,293
Interest	40,617,091	37,755,240	36,161,612	34,013,615
Benefit term changes	0	0	0	0
Differences between expected and actual experience*	(10,687,091)	(5,036,696)	5,103,664	13,360,614
Assumption changes	7,905,466	53,991,379	0	0
Benefit payments, including member refunds	(33,984,725)	(32,989,714)	(31,245,906)	(29,406,625)
Net change in Total Pension Liability	$16,796,308	$64,652,306	$20,633,056	$26,957,897
Total Pension Liability - beginning	$547,621,617	$482,969,311	$462,336,255	$435,378,358
Total Pension Liability - ending (a)	$564,417,925	$547,621,617	$482,969,311	$462,336,255
Plan Fiduciary Net Position				
Employer contributions	$34,246,826	$33,642,497	$32,696,686	$29,264,877
Employee contributions	786,745	661,206	488,193	294,810
Net investment income	4,680,131	28,082	(3,610,352)	21,394,750
Benefit payments, including member refunds	(33,984,725)	(32,989,714)	(31,245,906)	(29,406,625)
Administrative expenses	(150,387)	(136,983)	(123,015)	(105,693)
Other	0	0	0	0
Net change in Plan Fiduciary Net Position	$5,578,590	$1,205,088	($1,794,394)	$21,442,119
Plan Fiduciary Net Position – beginning	$132,056,351	$130,851,263	$132,645,657	$111,203,538
Plan Fiduciary Net Position - ending (b)	$137,634,941	$132,056,351	$130,851,263	$132,645,657
Net Pension Liability - ending (a) - (b)	$426,782,984	$415,565,266	$352,118,048	$329,690,598
Plan Fiduciary Net Position as a percentage of the Total Pension Liability	24.39%	24.11%	27.09%	28.69%
Covered payroll	$58,591,661	$57,421,016	$55,656,457	$49,587,936
Employers' Net Pension Liability as a percentage of covered payroll	733.92%	723.72%	632.66%	664.86%

Note: Schedule is intended to show 10-year trend. Additional years will be reported as they become available.

* For 2017, includes ($8,769,080) in transition/actuarial software changes.

Exhibit B

GASB 67 Paragraph 32(c)

SCHEDULE OF EMPLOYER AND NON-EMPLOYER CONTRIBUTIONS

	2017	2016	2015	2014
Actuarially determined employer contribution	$32,670,710	$33,642,497	$32,696,686	$29,264,877
Actual employer contributions	34,246,826	33,642,497	32,696,686	29,264,877
Annual contribution deficiency (excess)	($1,576,116)	$0	$0	$0
Covered payroll	$58,591,661	$57,421,016	$55,656,457	$49,587,936
Actual contributions as a percentage of covered payroll	58.45%	58.59%	58.75%	59.02%

Note: Information prior to 2017 was produced by the prior actuary.

APPENDIX B

SUMMARY OF BENEFIT PROVISIONS VALUED

Age and Service Retirement

Eligibility for Unreduced Benefit (for Members Hired Before 1/1/2011)

The earliest of attaining:

(1) At least 62 with 12 years of creditable service.
(2) At least 60 with 15 years of creditable service.
(3) At least 55 with 20 years of creditable service.

Eligibility for Unreduced Benefit (for Members Hired On or After 1/1/2011)

The earliest of attaining:

(1) At least 67 with 12 years of creditable service.
(2) At least 62 with 20 years of creditable service.

Benefit Amount

50% of compensation

Early Retirement

Eligibility for Reduced Benefit (for Members Hired Before 1/1/2011)

Age 60

Benefit Amount

(1) If between 60 and 62, years of service divided by 15 multiplied by 50% of compensation.
(2) If at least 62, years of service divided by 12 and multiplied by 50% of compensation.

Eligibility for Reduced Benefit (for Members Hired On or After 1/1/2011)

Age 62

Benefit Amount

(1) If between 60 and 67, years of service divided by 20 multiplied by 50% of compensation.
(2) If at least 67, years of service divided by 12 and multiplied by 50% of compensation.

Compensation used for Benefit Determination

The annual salary at date of termination of the highest position held.

Vested Deferred Benefits

Benefits for employees who terminate prior to eligibility for an immediate benefit are considered to be vested. Benefits commence once the individual qualifies for normal or early retirement based on age and service.

Death Benefits

Death Prior to Retirement

50% of the benefit the member would have been eligible to receive based on service to age 70 is payable to an eligible spouse or minor children.

Death After Retirement

50% of the benefit the retired member was receiving at the date of death to an eligible surviving spouse for members hired before January 1, 2011.

Disability Benefits

Disability benefits become payable at the time the member is eligible for normal retirement (50% of salary for remainder of term) and are computed based on the service that would have accrued if active employment had continued until normal retirement age, and member's compensation while an active employee.

Post-Retirement Benefit Adjustments

Benefits are increased to benefit recipients (including survivors) annually in accordance with the following formulas:

Increase in CPI	Formula 1 Benefit Increase	Formula 2 Benefit Increase
5.00% or less	4.00%	80% of CPI increase
5.01% - 6.24%	80% of CPI increase	80% of CPI increase
6.25% or more	5.00%	5.00%

Members first hired prior to August 28, 1997 receive COLAs based on Formula 1 until an aggregate increase of 65% is reached. At that point, subsequent COLAs based on Formula 2 are granted.

Members first hired on or after August 28, 1997 receive COLAs based solely on Formula 2.

Members hired prior to January 1, 2011 who work beyond the later of age 60 or the date when first eligible for age and service retirement will have their monthly benefit increased upon retirement. The percentage increase is equal to all COLAs for the years between (i) the later of age 60 or the date when first eligible for age and service retirement and (ii) date of actual retirement, not to exceed 65%.

Member Contributions

For members hired prior to 1/1/2011:	None
For members hired on or after 1/1/2011:	4.00% of salary, with interest credited at the 52-week Treasury bill rate.

APPENDIX B

STATEMENT OF ACTUARIAL ASSUMPTIONS

1. Long-term Rate of Return	7.50%, compounded annually, net of investment expenses. *(7.65% in June 30, 2016 valuation)*
2. Inflation	2.50% per year
3. Salary Increases	See items 3 under Demographic Assumptions
4. Payroll Growth	3.00% per year
5. Cost-of-Living Adjustment (COLA)	4.00% on a compounded basis when a minimum COLA of 4.00% is in effect. 2.00% on a compounded basis when no minimum COLA is in effect.
6. Interest on Member Contributions	1.50% per year

Demographic Assumptions

1. Mortality	The mortality assumption includes an appropriate level of conservatism that reflects expected future mortality improvement.
a. Post-retirement	RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 98%
b. Pre-retirement	RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015
c. Long-term disability	RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015

2. Retirement Assumption

Retirement Age	Hired Before 1/1/2011 Normal Retirement Male	Normal Retirement Female	Early Retirement Male	Early Retirement Female	Hired On or After 1/1/2011 Retirement Age	Normal Retirement Male	Normal Retirement Female
55	20%	3%					
56	16%	3%					
57	13%	3%					
58	9%	3%					
59	5%	3%					
60	8%	8%					
61	5%	8%					
62	8%	8%	6%	3%	62	30%	35%
63	10%	8%	6%	3%	63	20%	20%
64	12%	8%	6%	3%	64	15%	20%
65	12%	15%	6%	3%	65	30%	50%
66	20%	15%	6%	3%	66	25%	25%
67	20%	15%	6%	3%	67	20%	25%
68	30%	15%	6%	3%	68	20%	25%
69	30%	15%	6%	3%	69	30%	50%
70	100%	100%	100%	100%	70	100%	100%

3. Termination From Active Employment

Sample Ages	Percent of Active Members Separating within the Next Year: Death* Males	Death* Females	Disability Males	Disability Females	Pay Increase Assumptions for an Individual Employee: Merit & Seniority	Base (Economy)	Increase Next Year
25	0.03 %	0.01 %	0.01 %	0.01 %	2.20 %	3.00 %	5.20 %
30	0.03	0.02	0.02	0.01	2.20	3.00	5.20
35	0.04	0.03	0.03	0.02	1.48	3.00	4.48
40	0.05	0.04	0.04	0.03	0.76	3.00	3.76
45	0.07	0.05	0.05	0.04	0.60	3.00	3.60
50	0.13	0.09	0.08	0.07	0.54	3.00	3.54
55	0.24	0.16	0.13	0.12	0.44	3.00	3.44
60	0.42	0.23	0.20	0.19	0.00	3.00	3.00
65	0.74	0.33	0.20	0.19	0.00	3.00	3.00
70	1.23	0.55	0.20	0.19	0.00	3.00	3.00

** The pre-retirement mortality table used was the RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015.*

Service Index	Percent of Active Members Separating within the Next Year Withdrawal	
	Males	Females
1	0.040 %	0.040 %
2	0.010	0.023
3	0.013	0.023
4	0.013	0.023
5	0.013	0.023
6-10	0.013	0.023
11-15	0.017	0.023
16+	0.010	0.010

Other Assumptions

1. Form of Payment — Hired before 1/1/2011 – 50% joint and survivor
   Hired on or before 1/1/2011 – Straight life annuity

2. Marital Status

   a. Percent married — 100% married

   b. Spouse's age — Females assumed to be four years younger than males.

3. Pay Increase Timing — Beginning of the fiscal year.

4. Decrement Timing — Decrements of all types are assumed to occur mid-year.

5. Eligibility Testing — Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.

6. Benefit Service — Exact fractional service is used to determine the amount of the benefit payable.

7. Decrement Relativity — Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.

8. Decrement Operation — Disability and withdrawal do not operate during normal retirement eligibility.

9. Other Liability Adjustments — None

10. Incidence of Contributions — Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report,

	and the actual payroll payable at the time contributions are made. New entrant normal cost contributions are applied to the funding of new entrant benefits.
11. Forfeitures	No vested member are assumed to take a refund of employee contributions.
12. Salary and Benefit Limits	For purposes of the valuation, no limits were applied to member compensation or benefits.
13. Commencement age for deferred vested benefit	Normal retirement age

Data Adjustments

Active and retired member data was reported as of May 31, 2017. It was brought forward to June 30, 2017 by adding one month of service for all active members and the June COLA for certain retired members. Financial information continues to be reported as of June 30. This procedure was instituted to provide sufficient time for the Board of Trustees to certify the appropriate contribution rate prior to the October 1 statutory deadline.

Active members reported with no annualized salary were assumed to receive the average active member pay.

TECHNICAL VALUATION PROCEDURES

Other Valuation Procedures

Salary increases are assumed to apply to annual amounts.

Decrements are assumed to occur mid-year, except that immediate retirement is assumed for those who are at or above the age at which retirement rates are 100%. Standard adjustments are made for multiple decrements.

No actuarial liability is included for participants who terminated without being vested prior to the valuation date, except those due a refund of contributions.